Linear Algebra, EE 10810/EECS 205004
Quiz $1.3 - 1.4$

Student ID: ....; Your Name: ....
(Dated: September 30th, 2020)

Integrity: There is NO space to cross the **Red Line** !!

1. Let $\mathcal{W}$ be a subspace of a vector space $\mathcal{V}$ over a field $\mathcal{F}$. For any $\nu \in \mathcal{V}$, the set $\nu + \mathcal{W} = \{\nu + w : w \in \mathcal{W}\}$ is called the *coset* of $\mathcal{W}$ containing ν.

   (a) Prove that $\nu + \mathcal{W}$ is a subspace of $\mathcal{V}$ if and only if $\nu \in \mathcal{W}$.

   (b) Prove that $\nu_1 + \mathcal{W} = \nu_2 + \mathcal{W}$ iff $\nu_1 - \nu_2 \in \mathcal{W}$.

2. Solve the system of linear equations by Gaussian elimination method,

$$
\begin{cases}
2x_1 & -2x_2 & -3x_3 & & = & -2 \\
3x_1 & -3x_2 & -2x_3 & +5x_4 & = & 7 \\
x_1 & -x_2 & -2x_3 & -x_4 & = & -3
\end{cases}
\tag{1}
$$

3. Reduce the following Matrix into *Echelon (Trapezoid)* form:

$$
\bar{\bar{\mathbf{A}}} = \begin{bmatrix} 1 & -1 & 0 & 0 \\ -1 & 2 & -1 & 0 \\ 0 & -1 & 2 & -1 \\ 0 & 0 & -1 & 1 \end{bmatrix}
\tag{2}
$$